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WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
WASHINGTON

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,
and
DEPARTMENT of CONSERVATION STATE of WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with the U.S. Forest Service, U.S. Geological Survey, National Park Service, and other Federal, State and private organizations.

||||||| AS OF |||||||
MAY 1, 1964

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 2807, Portland, Oregon 97208.

PUBLISHED BY SOIL CONSERVATION SERVICE

<u>REPORTS</u>	<u>ISSUED</u>	<u>LOCATION</u>	<u>COOPERATING WITH</u>
RIVER BASINS			
WESTERN UNITED STATES _____	MONTHLY (FEB.-MAY) _____	PORTLAND, OREGON _____	ALL COOPERATORS
BASIC DATA SUMMARY _____	OCTOBER 1 _____	PORTLAND, OREGON _____	ALL COOPERATORS
STATES			
ALASKA _____	MONTHLY (MAR.-MAY) _____	PALMER, ALASKA _____	ALASKA S.C.D.
ARIZONA _____	SEMI-MONTHLY (JAN.15 - APR.1) _____	PHOENIX, ARIZONA _____	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO _____	MONTHLY (FEB.-MAY) _____	FORT COLLINS, COLORADO _____	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO _____	MONTHLY (JAN.-JUNE) _____	BOISE, IDAHO _____	IDAHO STATE RECLAMATION ENGINEER
MONTANA _____	MONTHLY (JAN.-JUNE) _____	BOZEMAN, MONTANA _____	MONT. AGR. EXP. STATION
NEVADA _____	MONTHLY (JAN.-MAY) _____	RENO, NEVADA _____	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES
OREGON _____	MONTHLY (JAN.-JUNE) _____	PORTLAND, OREGON _____	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH _____	MONTHLY (JAN.-JUNE) _____	SALT LAKE CITY, UTAH _____	UTAH STATE ENGINEER
WASHINGTON _____	MONTHLY (FEB.-JUNE) _____	SPOKANE, WASHINGTON _____	WN. STATE DEPT. OF CONSERVATION
WYOMING _____	MONTHLY (FEB.-JUNE) _____	CASPER, WYOMING _____	WYOMING STATE ENGINEER

PUBLISHED BY OTHER AGENCIES

<u>REPORTS</u>	<u>ISSUED</u>	<u>AGENCY</u>
BRITISH COLUMBIA _____	MONTHLY (FEB.-JUNE) _____	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA _____	MONTHLY (FEB.-MAY) _____	CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

FEDERAL-STATE-COOPERATIVE
SNOW SURVEY AND WATER SUPPLY FORECASTS
For
WASHINGTON

Report Prepared
By

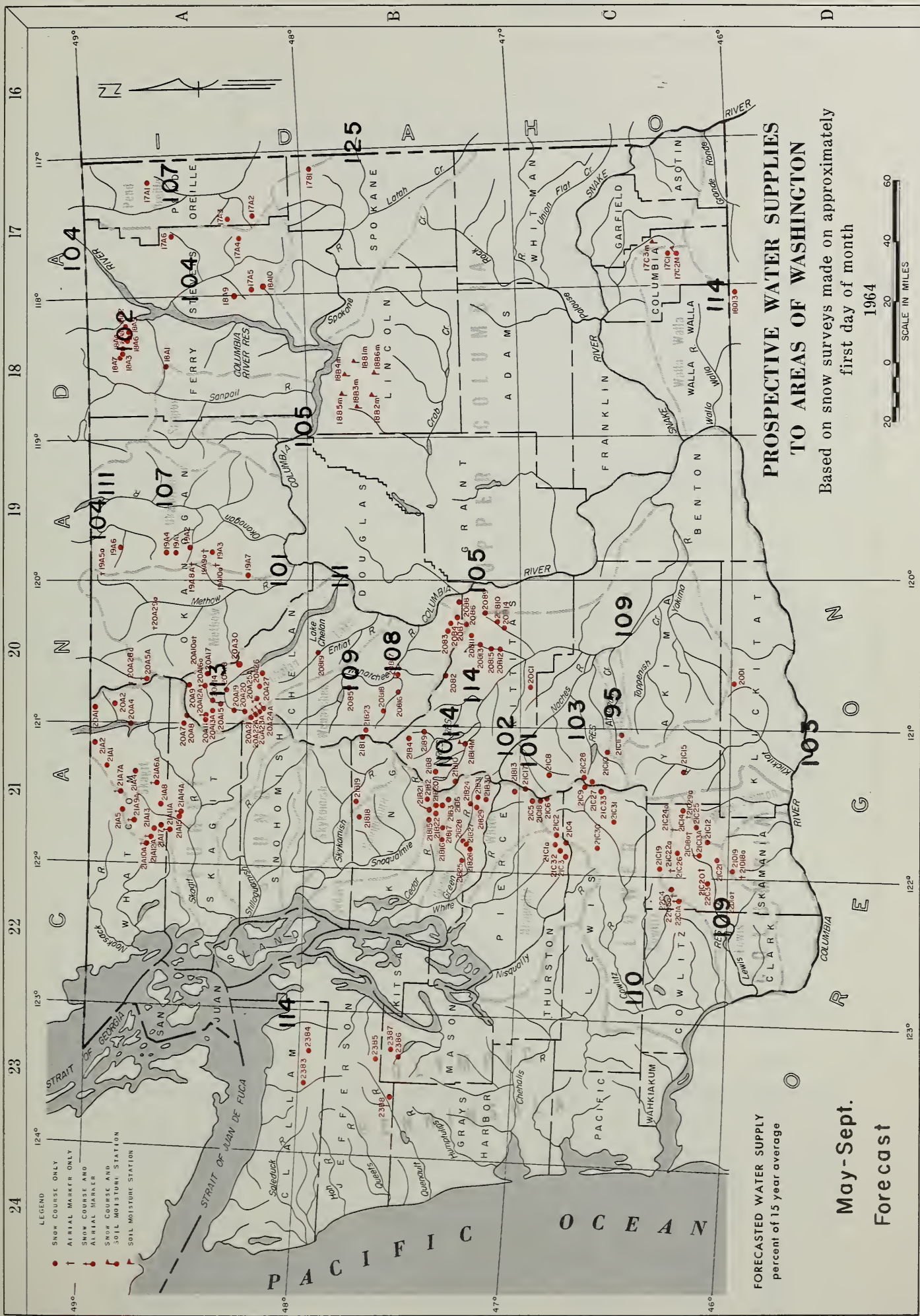
Robert T. Davis, Snow Survey Supervisor

Soil Conservation Service
840 Bon Marche Building
Spokane, Washington

Issued By

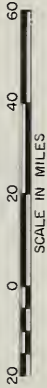
Orlo W. Krauter
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture

Murray G. Walker, Supervisor
Division of Water Resources
Department of Conservation
State of Washington



PROSPECTIVE WATER SUPPLIES TO AREAS OF WASHINGTON

Based on snow surveys made on approximately
first day of month
1964



FORECASTED WATER SUPPLY
percent of 15 year average

May-Sept.
Forecast

INDEX to WASHINGTON SNOW COURSES and SOIL MOISTURE STATIONS

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
UPPER COLUMBIA DRAINAGE																	
Pend Oreille River																	
Boyer Mountain	17A2	7	31N	43E	5250	Berne-Mill Creek	21B23	7	26N	15E	2925	Blue Lake	21C22a	19	9N	8E	4800
Bunchgrass Meadow	17A1	24	37N	44E	5000	Blewett Pass No. 2	20B2	35	22N	17E	4270	Bob's Trail	21C21	25	8N	7E	2200
Mt. Spokane	17B1	15	28N	45E	4650	Chinavum G. S.	20B16	4	25N	17E	1810	Calamity Ridge	22D1a	8	5N	5E	2500
Winchester Creek	17A3	30	33N	43E	2970	Lake Wenatchee	20B5	33	27N	17E	1970	Council Pass	21C18a	24	9N	9E	4200
						Leavenworth R. S.	20B17	1	24N	17E	1127	Divide Meadow	21C29a	21	9N	10E	5600
						Merritt	20B18	4	26N	16E	2140	Grand Meadow	21C25	28	8N	9E	3500
						Stevens Pass	21B1	14	26N	13E	4070	Lone Pine Shelter	21C26	8	9N	7E	3800
Kettle River																	
Boulder Road	18A2	36	39N	36E	1450	Squillehuck Creek											
Butte Creek	18A3	28	39N	35E	4070	Beehive Springs	20B3	12	21N	19E	4400	Muddy River	22C5a	24	8N	5E	3200
Cabin Creek	18A4	5	38N	36E	3170	Scout-A-Vista	20B4	18	21N	20E	3400	Oldman Pass	22C3	26	8N	6E	1400
Goat Creek	18A4	26	39N	35E	3595	Stemilt Creek											
Snow Caps Creek	18A5	3	38N	36E	2150	Jump-Off	20B8	34	21N	20E	4450	Plains of Abraham	22C1a	35	9N	5E	4400
Snow Caps Trail	18A6	5	38N	36E	2720	Stemilt Slide	20B6	30	21N	20E	5000	Smith Creek Road	22C4	29	9N	6E	2100
Summit G. S.	18A7	20	39N	35E	4600	Upper Wheeler	20B7	30	21N	20E	4400	Spencer Meadow	21C20a	16	8N	7E	3400
Colville River																	
Baird	17A6	19	36N	42E	3215	Crab Creek											
Carlson	18A9	34	32N	38E	2885	18B1m	32	27N	34E	2440	Cayuse Pass	21C6	15	16N	10E	5300	
Chevelah	17A4	11	32N	41E	4925	18B2m	20	26N	32E	2050	Mosquito Meadows	21C19	33	10N	7E	4100	
Stranger Mountain	17A5	26	31N	38E	4990	18B3m	28	27N	31E	2750	Onanapocosh	21C32	28	15N	10E	2200	
Togo	18A10	6	29N	38E	3370	18B4m	21	27N	33E	2420	Packwood Lake	21C31	21	13N	10E	2870	
						Krause	18B5m	17	27N	32E	2378	Pigtail Peak	21C33	11	14N	11E	5900
						Sherfells	18B6m	24	25N	32E	2290	Potato Hill	21C14	36	10N	10E	4500
						Wheatridge						Williams Creek	21C30	3	13N	8E	3250
Sherman Creek Pass	18A1	19	36N	35E	5350	Yakima River											
						Ahtanum R. S.	21C11	26	12N	14E	3100	Cowlitz River					
						Big Boulder Creek	21B9	35	23N	14E	3200	21C6	15	16N	10E	5300	
						Bumping Lake	21C8	23	16N	12E	3450	21C19	33	10N	7E	4100	
						Clockum Pass	20B9	25	20N	20E	5370	21C32	28	15N	10E	2200	
						Cooke Creek	20B10	17	19N	20E	4123	21C31	21	13N	10E	2870	
						Fish Lake	21B4	34	24N	14E	3371	21C33	11	14N	11E	5900	
						Green Lake	21C10	3	12N	13E	6000	21C14	36	10N	10E	4500	
						Grouse Camp	20B11	29	21N	19E	5385	21C30	3	13N	8E	3250	
						High Creek	20B12	34	20N	19E	2930	Baker River					
						Lake Ole Elum	21B14M	15	20N	14E	2200	21A11a	8	36N	8E	3800	
						Manashtash	20C1	24	17N	16E	3935	21A7a	19	39N	11E	5200	
						Morse Lake	21C17	6	16N	11E	5400	21A6a	23	38N	8E	3600	
						Nanum	20B13	4	20N	19E	3875	21A9a	23	38N	8E	3600	
						Trail Creek	20B14	20	19N	20E	3360	21A12a	20	37N	8E	2100	
						Tunnel Avenue	21B8	13	21N	11E	2450	21A10a	18	37N	8E	3400	
						Walters Flat	20B15	22	20N	19E	3360	Schreibers Meadow	21A14a	20	36N	9E	2200
						White Pass	21C9	2	13N	11E	4500	S. F. Thunders Creek	21A13	22	37N	8E	1600
						White Pass (East Side)	21C28	2	13N	11E	4500	Sulphur Creek	21A15	18	36N	9E	1600
						White Pass (Leach Lake)	21C27	1	13N	11E	4500	Three Mile Creek	21A13	22	37N	8E	1600
												Watson Lakes	21A15	18	36N	9E	1600
												Nooksack River					
												21A5	17	39N	9E	4300	
OLYMPIC PENINSULA																	
Dungeness River																	
Deer Park							23B4	1	28N	5W	5200						
Elwha River																	
Hurricane							23B3	36	29N	7W	4500						
Skokomish River																	
Black and White Lakes							23B7	17	24N	5W	4200						
Black and White Home Sweet Home							23B6	16	24N	5W	4700						
Sundown Pass							23B5	28	25N	5W	3900						
							23B8	25	24N	7W	3900						
LEGEND																	
NUMBERING SYSTEM EXAMPLE																	
							21A7	SNOW COURSE ONLY									
							21A7a	AERIAL MARKER ONLY									
							21A7M	SNOW COURSE AND AERIAL MARKER									
							21A7M	SNOW COURSE AND SOIL MOISTURE STATION									
							21A7M	SOIL MOISTURE STATION									

WATER SUPPLY OUTLOOK

State of Washington
May 1, 1964

* The water supply outlook for irrigation and power in the State of *
* Washington continues to be good. The weather picture over the Col- *
* umbia Basin as a whole has been cold during the month of April *
* which has retarded snowmelt and added water to the snowpack at both *
* low and high elevations. Forecasts of streamflow have generally *
* been improved over that which was reported last month. This is a *
* result of the lack of runoff during the month of April as well as *
* the improved snow picture in the hills. Reservoir storage contin- *
* ues to be low and some reservoirs have been pulled down farther due *
* to the start of the irrigation season. It is still anticipated *
* that all reservoirs will fill with the spring runoff. *

COLUMBIA MAINSTEM

The Columbia River forecast is for a flow as measured at Birchbank of 42,000,000 acre feet during the May-September period, or 4% greater than normal. At Grand Coulee for the same period it is expected to be 63,800,000, or 5% greater; below Priest Rapids Dam, 72,300,000, also 5% greater; and at The Dalles, Oregon, 95,000,000, or 3% greater than normal. May-June flows for the Columbia at The Dalles is expected to be 60,500,000 acre feet, or 4% greater than normal. River flows during the month of April were only 69% of normal at this station.

PEND OREILLE-SPOKANE RIVERS

Snow courses on the Pend Oreille continue to show well above normal water equivalents and a couple of new courses in the Spokane River showed an increase over that which was measured on the first of April. This is generally not prevalent in this interior mountainous area but because of the cold weather during the month of April it is understandable. Several of the precipitation stations in this area reported well above normal amounts during the month of April and one station for the winter has measured 500% of normal.

The flow of the Pend Oreille was only 58% of normal during the month of April and the Spokane 76%. Forecasts of these streams are expected to be above normal and improved over that which was reported last month. During the May-September period the Pend Oreille is expected to flow 15,200,000 acre feet or 7% greater than normal and the Spokane 2,650,000, or 25% greater. Precipitation over the watershed as a whole was slightly better than normal for the first time since last fall.

COLVILLE-KETTLE RIVERS

In the Colville-Kettle drainages there is only one snow course that has records in excess of three years and this course, in Canada, has a water equivalent well above that which was measured in 1963 and 1962 and also its average. When comparing the other snow courses to their records of the last two years, those that had a snowcover are considerably better than that which occurred in either 1963 or 1962.

Runoff of the Kettle River during the month of April was only 54% of normal and precipitation during the month was below normal as it has been all winter.

The forecast of the Kettle River as measured near Laurier for the May-September period is for a flow 1,700,000 acre feet, or 2% above normal. The Colville River as measured at Kettle Falls is expected to have a flow during the same period of 106,000 acre feet or 4% greater than normal.

OKANOGAN-METHOW RIVERS

The outlook for irrigation and water supply in the Okanogan watershed continues to improve over that which was reported last month. Snowpack in the northern portion of the basin in Canada has improved even more than that which was reported last month and river flows from Canada were well below normal. The irrigation picture on the Methow River, while still good, is not as good as that which is expected on the Okanogan but still above normal.

Inflow to Salmon Lake and Conconully Reservoir on Salmon Creek is now expected to be 14,000 acre feet or 61% of its 23,000 acre feet normal. If this inflow occurs, it will be the same as that which occurred last year during the April-July period. Forecast of the Similkameen as measured near Nighthawk is for a flow 1,590,000 acre feet, or 4% greater than normal for the May-September period. The Okanogan at Oroville is expected to flow 740,000 acre feet, or 11% greater than normal for the same period. The combined flow of these rivers as measured near Tonasket is expected to be 1,890,000 acre feet, or 7% greater for the same period. The Methow River as measured near Pateros is expected to flow 1,050,000 acre feet or 1% greater than normal. For the Methow this is a reduction of 3% from that which was reported last month.

Valley precipitation during the month of April was below normal and for the spring months well below. This is similar to that which has occurred since December 1963.

WENATCHEE-CHELAN-ENTIAT RIVERS

The irrigation outlook for these watersheds continues to improve over that which was reported last month. The snowpack in the Chelan Lake Basin is measured by only one snow course and this course is well above its 13-year average. On the Entiat River there is only one low

elevation course which reported no snow as it has during the last three years. There are three courses on the Wenatchee River with sufficient years of record to be used in computing a normal and these all had well above normal snowpacks. The other courses with shorter records when compared to the last couple of years, indicate a snowpack considerably greater than 1963 and 1962. The Stemilt Basin drainage with five snow courses measured on the first of May indicated no snow where last month they had a good snowpack. Most of the water from this snow, as reported by the local snow surveyors, evaporated or infiltrated because there was very little runoff.

Runoff from the mainstems of the Chelan and Wenatchee were 64% to 66% of normal during the month of April. Precipitation during the month was well below normal as has been reported throughout the fall and winter months.

Forecast for the Chelan River as measured at Chelan is for a flow of 1,300,000 acre feet or 11% greater than normal for the May-September period. The Stehekin River is expected to flow 925,000 or 13% greater than normal for the same period. The Wenatchee at Plain is expected to flow 1,300,000 or 9% greater and at Peshastin, 1,790,000 or 8% greater for the same period. Flow from the Stemilt Basin is expected to be 122,000 miners inches during the May-September period.

YAKIMA RIVER

The outlook for irrigation and water supply continues to improve over the northern portion of the Yakima River watershed but that through the central part, or Naches River drainage, remains about the same as was reported last month, but this is still good. The snowcover over the watershed as a whole is well above normal with the exception of one snow course on the American River drainage and all courses have reported a snowpack considerably greater than was measured in both 1963 and 1962.

Reservoir storage continues to be below normal with considerable draft of the Rimrock Reservoir for irrigation purposes. Streamflow during the month of April was well below normal due to the cold temperatures which reduced snowmelt in the higher Cascades. Precipitation was above normal in the northern portion of the basin and below normal in the Naches drainage.

Forecasts of streamflow which can be found elsewhere in this report range from a low of 5% below normal for the Ahtanum Creek near Tampico to a high of 14% above normal for the Kachess River as measured near Easton.

WALLA WALLA RIVER

The outlook for irrigation water supplies for the 1964 season continues to be good for the Walla Walla River watershed as a whole. Forecast of the South Fork of the Walla Walla River as measured near Milton has been reduced slightly from that which was reported last

month but Mill Creek as measured near Walla Walla itself is expected to have a greater flow than that which was anticipated last month.

Flow of the Walla Walla River was only 75% of normal during the month of April and although valley precipitation was below normal, mountain precipitation in the form of snow continued to build up with very little melting. Soil moisture stations both in Oregon and Washington report only small increases over that which was indicated last month.

Forecasts of the South Fork of the Walla Walla as measured near Milton are for flows of 60,000 acre feet and the Mill Creek forecast is 25,000 acre feet for the May-September period, of 14% greater than normal.

LOWER COLUMBIA DRAINAGE

Snow records for the drainages of the Lower Columbia in Washington are generally too short to be used in comparing averages. Most of the snow courses in that area were put in four years ago. The few courses with records going back 11 years indicate a snowpack that is generally greater than normal and all courses indicate a snowpack well above that which was measured in both 1963 and 1962. As a result of this above-normal snowpack and in spite of the lack of precipitation in these drainages, forecasts of both the Lewis and Cowlitz have been increased percentagewise over that which was reported last month.

The Lewis River is now expected to flow 1,100,000 acre feet or 9% greater than normal for the May-September period. The Cowlitz River for the same period is expected to have a flow of 2,400,000 acre feet or 10% greater than normal. Streamflow from the Lewis River during the month of April was near 25% below normal and during the first five days of May, near 40% below normal. Temperatures continue to be very low in this watershed and precipitation falling in the higher elevations is occurring as snow.

PUGET SOUND

Very little information is available for most of the Puget Sound drainages on the first of May but the snow courses that are measured indicate a snowpack that is well above normal at the higher elevations. Low elevation snow courses are not measured but it is anticipated that they too would have above-normal snowcover.

Precipitation along the whole west slope of the Cascades was above normal during the month of April and above normal for the spring period to date. Winter valley precipitation also was below normal in the north and near normal to slightly above in the southwest.

In the northern portion of the basin of the Skagit and Baker Rivers, extensive snow surveys are made and these at all elevations indicate a better than normal snowpack and a well above when compared with both 1963 and 1962. High elevation courses in the Baker River as well as the Nooksack River are thought to be amongst the greatest that have been experienced in the past decade although actual records do not extend back that far.

OLYMPIC PENINSULA

For the first time records were obtained on the snow courses on the Dungeness and Elwha Rivers and Morse Creek as of the first of May. It looks like the snowpack has been depleted from that which was measured on April 1 but not to the extent that could normally be expected. Precipitation at Sequim was reported to be below normal during the past month and temperatures at high elevations were well below normal, resulting in flows of the Dungeness River less than normal. As a result, the forecast of the Dungeness has been increased percentagewise 2%. It is now expected that this river will have, during the May-September period, a runoff of 170,000 acre feet or 14% greater than normal.

STREAMFLOW FORECASTS - MAY 1964

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-Yr. Avg.	Fore- cast Period	Measured 1963	Runoff 1962	Runoff 1961	15-Yr. Average 1943-57
<u>COLUMBIA BASIN</u>							
<u>Columbia River System</u>							
<u>Columbia River</u>							
at Birchbank <u>1/</u>	42000	104	May-Sep		38085	46281	40302
	32700	105	May-Jul		28269	37397	31239
	22250	105	May-Jun		18667	28765	21193
<u>Columbia River</u>							
at Grand Coulee <u>1/</u>	63800	105	May-Sep		54507	65715	60753
	52800	106	May-Jul		43150	55484	49818
	38900	106	May-Jun		31738	45178	36679
<u>Columbia River</u>							
bl. Priest Rapids Dam <u>1/</u>	72300	105	May-Sep		58866	71863	66930
	57700	105	May-Jul		46875	61055	54981
	43000	106	May-Jun		34528	49665	40524
<u>Columbia River</u>							
at The Dalles, Ore. <u>1/</u>	95000	103	May-Sep	76867	77871	91017	92296
	78700	103	May-Jul	61720	62212	77406	76409
	60500	104	May-Jun	46210	47596	64014	58214
<u>Pend Oreille River System</u>							
<u>Pend Oreille River</u>							
bl. Box Canyon	15200	107	May-Sep	9974	12003	13424	14221
	13700	106	May-Jul	8952	10893	12511	12880
	11250	106	May-Jun	7355	9448	11263	10593
<u>Kettle River System</u>							
<u>Kettle River</u>							
nr. Laurier	1700	102	May-Sep	1181	1340	1829	1663
	1600	102	May-Jul	1120	1254	1782	1568
	1435	103	May-Jun	980	1117	1695	1396

1/ Observed flow corrected for storage in any of the following reservoirs which are above the station: Kootenay Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee, Noxon Reservoir and pumpage at F. D. Roosevelt Lake.

Streamflow Forecasts - May 1964 (Cont'd)

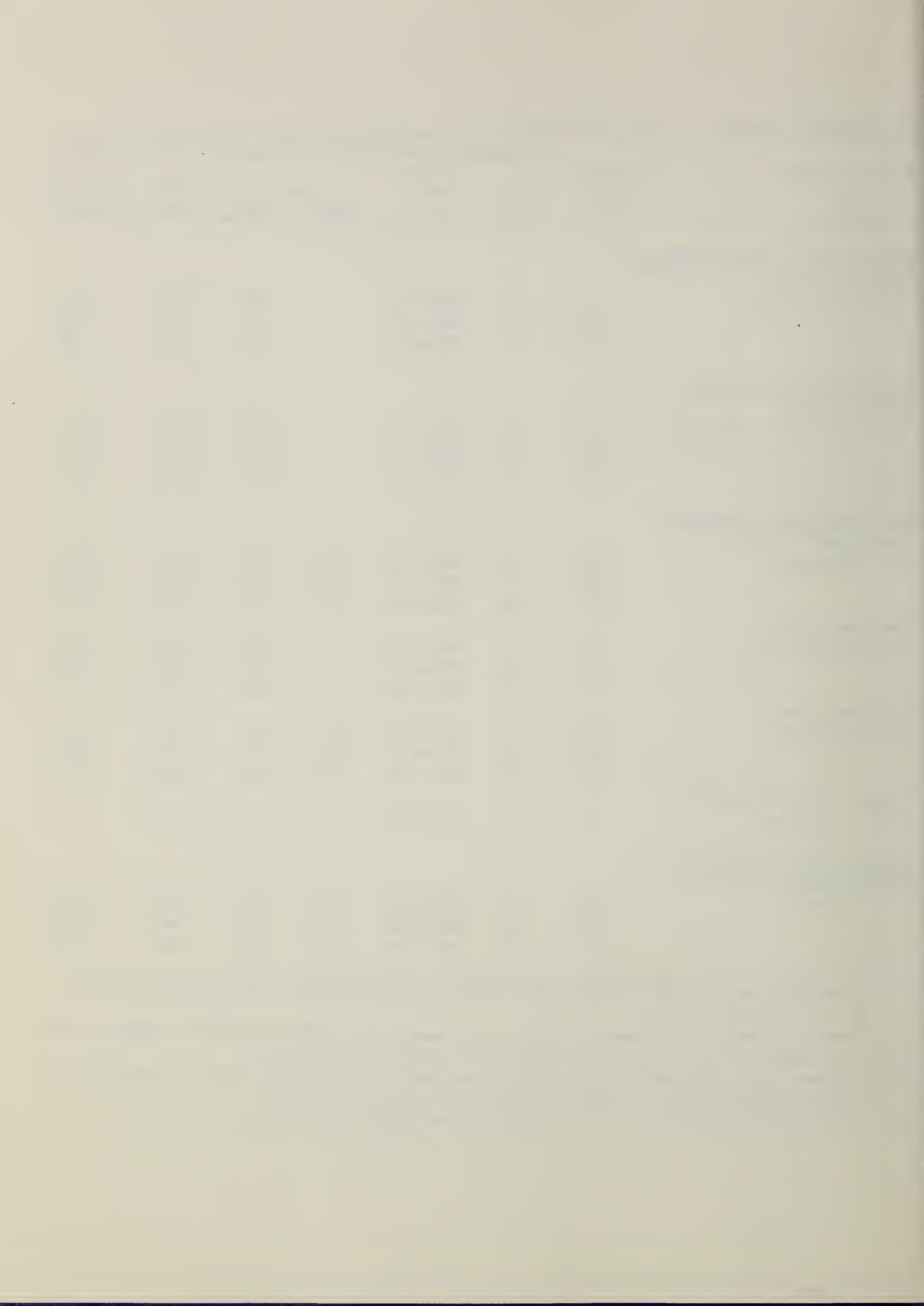
Basin, Stream and Station		Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet				
			% 15-Yr. Avg.	Fore- cast Period	1963	Measured Runoff 1962	1961
<u>Kettle River System (Cont'd)</u>							
<u>Colville River</u>							
at Kettle Falls	106	104	May-Sep		81	161	102
	93	104	May-Jul		70	145	89
	81	104	May-Jun		63	130	78
<u>Spokane River System *</u>							
<u>Spokane River</u>							
at Post Falls, Ida. <u>2/</u>	2650	125	May-Sep		1763	2182	2127
	2550	124	May-Jul		1679	2120	2051
	2350	124	May-Jun		1572	2022	1894
<u>Okanogan River System **</u>							
<u>Similkameen River</u>							
nr. Nighthawk	1590	104	May-Sep	1140	992	1411	1533
	1490	105	May-Jul	989	909	1350	1419
	1270	106	May-Jun	773	763	1230	1196
Okanogan River							
at Oroville <u>3/</u>	740	111	May-Sep		590	601	669
	675	109	May-Jul		509	585	618
	615	110	May-Jun		442	542	560
Okanogan River							
nr. Tonasket	1890	107	May-Sep	1150	1084	1560	1774
	1690	106	May-Jul	990	970	1448	1593
	1420	107	May-Jun	766	807	1300	1322
Salmon Lake-Conconully							
Res. - Inflow	14	61	Apr-Jul	14	6	16	23
<u>Methow River System **</u>							
<u>Methow River</u>							
nr. Pateros	1050	101	May-Sep	819	545	990	1037
	970	101	May-Jul	743	482	943	961
	820	102	May-Jun	624	395	857	806

* Forecasts made by Morlan W. Nelson and J. Alden Wilson, Soil Conservation Service, Boise, Idaho

** These forecasts are based in part upon base flow data especially prepared and furnished for the purpose by the U. S. Geological Survey.

2/ Observed flow corrected for storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie Canals.

3/ Observed flow corrected for storage, diversions and evaporation.



Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-Yr. Avg.	Fore- cast Period	Measured Runoff			15-Yr. Average
				1963	1962	1961	1943-57
<u>Chelan River System</u>							
<u>Chelan River</u>							
at Chelan <u>4/</u>	1300	111	May-Sep		789	1204	1169
	1140	112	May-Jul		675	1092	1021
	890	114	May-Jun		500	903	783
<u>Stehekin River</u>							
at Stehekin	925	113	May-Sep		632	898	818
	785	113	May-Jul		517	781	694
	575	113	May-Jun		370	630	508
<u>Wenatchee River System</u>							
<u>Wenatchee River</u>							
at Plain	1300	109	May-Sep		859	1214	1194
	1170	109	May-Jul		756	1122	1072
	900	109	May-Jun		571	943	824
<u>Wenatchee River</u>							
at Peshastin	1790	108	May-Sep		1183	1652	1649
	1620	109	May-Jul		1050	1536	1491
	1250	108	May-Jun		795	1303	1154
<u>Stemilt Basin</u>							
nr. Wenatchee	122*	--	May-Sep		146*	128*	--
<u>Yakima River System</u>							
<u>Yakima River</u>							
nr. Martin <u>5/</u>	145	110	May-Sep	55	75	120	132
	135	112	May-Jul	50	67	113	121
	112	111	May-Jun	44	55	104	101
<u>Yakima River</u>							
at Cle Elum <u>6/</u>	965	114	May-Sep	457	584	818	847
	880	114	May-Jul	397	509	757	770
	740	115	May-Jun	340	420	674	642
<u>Yakima River</u>							
nr. Parker <u>7/</u>	1640	109	May-Sep		851	1462	1504
	1640	110	May-Jul		843	1484	1484
	1440	110	May-Jun		757	1408	1315

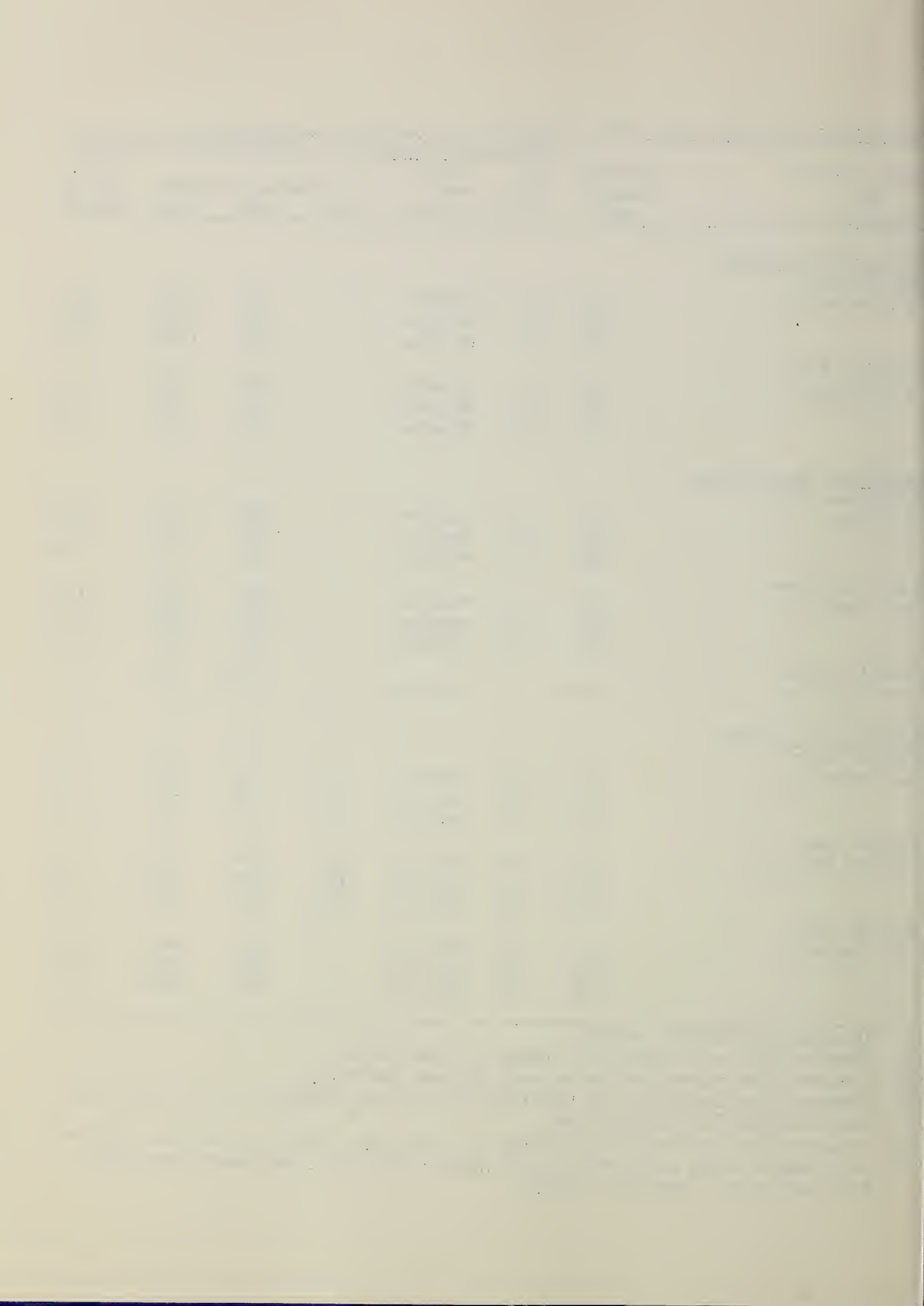
* Thousands of Miners' inches.

4/ Observed flow corrected for storage in Lake Chelan.

5/ Observed flow corrected for storage in Lake Keechelus.

6/ Observed flow corrected for storage in Keechelus, Kachess and Cle Elum Lakes and diversion by Kittitas Canal.

7/ Observed flow corrected for storage in Keechelus, Kachess, Cle Elum, Bumping and Rimrock Lakes and diversions by Roza, Union Gap, New Reservation, Old Reservation and Sunnyside Canals.



Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station		Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet				
			% 15-Yr. Avg.	Fore- cast Period	1963	Measured Runoff 1962	1961
<u>Yakima River System (Cont'd)</u>							
Kachess River							
nr. Easton <u>8/</u>	127	114	May-Sep	46	71	105	111
	121	114	May-Jul	43	65	101	106
	104	114	May-Jun	40	56	93	91
Cle Elum River							
nr. Roslyn <u>9/</u>	495	112	May-Sep	242	312	441	443
	455	113	May-Jul	212	281	410	404
	370	113	May-Jun	190	227	357	328
Bumping River							
nr. Nile <u>10/</u>	145	101	May-Sep	73	101	149	144
	135	103	May-Jul	66	90	139	131
	105	102	May-Jun	58	71	118	103
American River							
nr. Nile	120	102	May-Sep		81	132	118
	110	101	May-Jul		73	123	109
	90	103	May-Jun		57	105	87
Tieton River							
at Tieton Dam <u>11/</u>	245	103	May-Sep	144	169	240	237
	205	103	May-Jul	114	136	201	199
	160	106	May-Jun	94	98	161	151
Naches River							
nr. Naches <u>12/</u>	825	102	May-Sep		544	844	809
	750	103	May-Jul		471	764	729
	625	105	May-Jun		375	657	596
Ahtanum Creeks							
nr. Tampico <u>13/</u>	40	95	May-Sep	30	30	48	42
	36	95	May-Jul	27	26	43	38
	31	97	May-Jun	23	21	38	32
<u>Lower Columbia River System</u>							
Mill Creek							
nr. Walla Walla	25	114	May-Sep	12	16	18	22
	20	111	May-Jul	9	12	14	18
	17	113	May-Jun	7	10	12	15

8/ Observed flow corrected for storage in Lake Kachess.9/ Observed flow corrected for storage in Lake Cle Elum.10/ Observed flow corrected for storage in Bumping Lake.11/ Observed flow corrected for storage in Rimrock Lake.12/ Observed flow corrected for storage in Bumping and Rimrock Lakes and diversions by Tieton, Selah Valley, Wapatox Canals and City of Yakima.13/ Observed flow of North and South Forks (combined).

Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-Yr. Avg.	Fore- cast Period	Measured 1963	Runoff 1962	Average 1961	15-Yr. Average 1943-57

Lower Columbia River System (Cont'd)

Lewis River							
at Ariel <u>14/</u>	1100	109	May-Sep	676	765	875	1011
	950	111	May-Jul	557	622	732	857
	770	110	May-Jun	466	530	635	703
Cowlitz River							
at Castle Rock <u>15/</u>	2400	110	May-Sep	1482	1820	2097	2180
	2050	110	May-Jul	1204	1509	1810	1863
	1650	112	May-Jun	972	1214	1524	1477

OLYMPIC PENINSULA

Dungeness River System

Dungeness River							
nr. Sequim	170	114	May-Sep	120	109	175	149
	135	113	May-Jul	92	85	145	119
	95	113	May-Jun	64	59	104	84

14/ Observed flow corrected for storage in Lake Merwin, Yale and Swift Reservoirs

15/ Observed flow corrected for storage in Mayfield Reservoir.

RESERVOIR STORAGE - 1000 Acre Feet

BASIN or STREAM	RESERVOIR <u>1/</u>	USABLE CAPACITY	1964	Measured (May 1) 1963	1962	Normal*
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	889.0	241.9	181.8	371.3	356.7
Columbia	Franklin D. Roosevelt Lake	5232.0	2983.9	2795.0	2662.0	3853.3
Columbia	Banks Lake <u>2/</u>	761.8	---	219.5	430.6	---
Okanogan	Conconully Reservoir	13.0	5.1	6.6	6.6	8.9
Okanogan	Salmon Lake	10.5	9.5	5.5	7.4	9.1
Chelan	Lake Chelan	676.1	121.8	357.9	278.4	251.8
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	74.5	157.0	146.9	108.8
Kachess	Kachess Lake	239.0	172.0	241.2	227.0	196.7
Cle Elum	Lake Cle Elum	436.9	143.1	416.4	400.6	326.6
Bumping	Bumping Lake	33.7	4.6	34.3	32.0	21.7
Tieton	Rimrock Lake	198.0	79.7	198.1	189.2	148.4
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1202.9	718.0	1094.9	810.8	290.2
Skagit	Diablo Reservoir	90.6	84.0	86.7	82.9	86.1
Skagit	Gorge Reservoir	9.8	8.2	7.5	8.2	---

1/ Based on Active Storage.

2/ Less than 15-year record in period 1943-57.

* 15-year average 1943-57.

SOIL MOISTURE - MAY

Drainage Basin and Station	Number	Elev.	Profile (Inches)		Soil Moisture Content		
			Depth	Capacity	Total : (Inches)	as of May 1	
					1964	1963	1962
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	10.79	11.00	11.53
Govan	18B2m	2100	48	13.6	11.38	11.91	12.36
Jack Woods	18B3m	2600	48	13.6	9.27	9.99	10.35
Krause	18B4m	2440	48	13.6	9.91	9.55	9.19
Sheffels	18B5m	2360	48	13.6	6.05	7.97	7.06
Wheatridge	18B6m	2200	48	13.6	7.93	8.73	8.14
<u>OKANOGAN</u>							
Trout Creek	3-M	3600	48	7.3	4.37*	3.77*	3.25*
<u>YAKIMA</u>							
Lake Cle Elum	21B14M	2200	48	12.8	9.12	12.30	12.30
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	9.63	9.63	10.56
Helmers	17C2M	4400	48	12.0	10.95	11.66	11.40

* April 1 measurement.

FALL SOIL MOISTURE

Drainage Basin and Station	Number	Elev.	Profile (Inches)		Soil Moisture Content		
			Depth	Capacity	Total : (Inches)	as of Oct. 1	
					1963	1962	1961
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	5.12	9.40	4.25
Govan	18B2m	2100	48	13.6	5.79	9.95	5.60
Jack Woods	18B3m	2600	48	13.6	6.75	7.06	7.35
Krause	18B4m	2440	48	13.6	5.23	9.47	4.99
Sheffels	18B5m	2360	48	13.6	3.69	6.69	3.67
Wheatridge	18B6m	2200	48	13.6	4.50	7.49	4.09
<u>OKANOGAN</u>							
Trout Creek	3-M	3600	48	7.3	3.23	2.80	3.00
<u>YAKIMA</u>							
Lake Cle Elum	21B14M	2200	48	12.8	6.63	6.80	9.50
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	5.73	7.20	6.60
Helmers	17C2M	4400	48	12.0	5.75	7.60	6.90

PRECIPITATION 1/

Division Averages and Departures

DRAINAGE DIVISIONS	Fall		Winter		Spring	
	Sept.-Nov. 1963	<u>2/</u>	Dec. '63-Feb. '64	<u>2/</u>	Mar-April '64	<u>2/</u>
	Observed	-Departure	Observed	-Departure	Observed	-Departure
Columbia in Canada	6.79	+ 1.02	6.92	- 1.36	2.42	- 0.43
Pend Oreille - Spokane	8.05	- 0.78	9.06	- 2.42	5.85	+ 0.86
Northeastern Washington	5.33	+ 0.11	5.75	- 0.72	2.74	- 0.13
Southeastern Washington	5.60	- 0.30	6.92	- 0.62	3.20	+ 0.03
Central Washington	9.93	- 3.16	16.54	- 4.89	4.92	- 1.71
North Central Washington	3.40	+ 0.21	4.19	- 0.31	0.98	- 0.66
Northwest Slope Cascades	26.46	+ 3.93	31.34	- 0.36	17.70	+ 4.43
Southwest Slope Cascades	16.24	+ 0.57	24.80	+ 0.09	10.08	+ 0.82
Blue Mountains, Oregon	5.02	+ 0.23	5.87	- 1.60	3.17	- 0.32
Lower Columbia in Oregon	4.76	- 0.58	5.61	- 2.38	1.75	- 1.11

Northeastern Washington - Lower Spokane, Colville, Sanpoil and Lower Kettle Drainages.

Southeastern Washington - Touchet, Tucannon and Palouse Drainages.

Central Washington - Yakima, Wenatchee and Chelan Drainages.

North Central Washington - Methow and Okanogan Drainages.

Northwest Slope Cascades - Puget Sound Drainages.

Southwest Slope Cascades - Lower Columbia Drainages.

1/ - Preliminary analysis by U. S. Weather Bureau from data furnished by Meteorological Services of Canada and U. S. Weather Bureau.

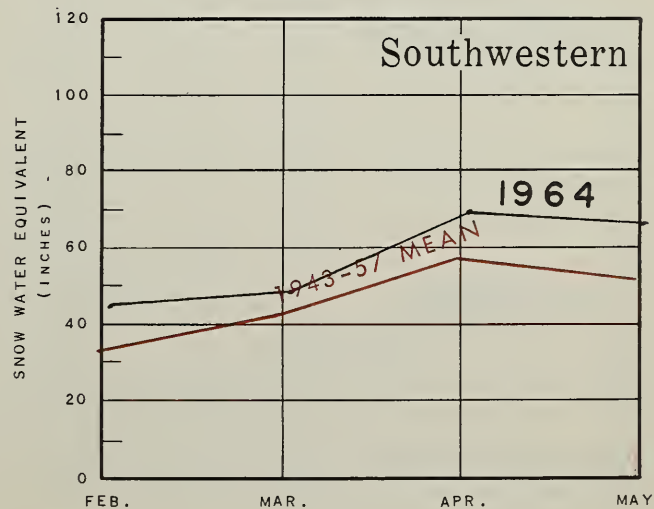
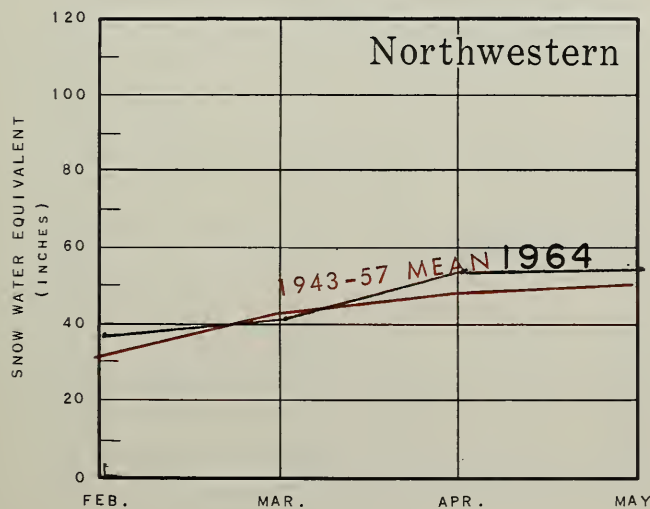
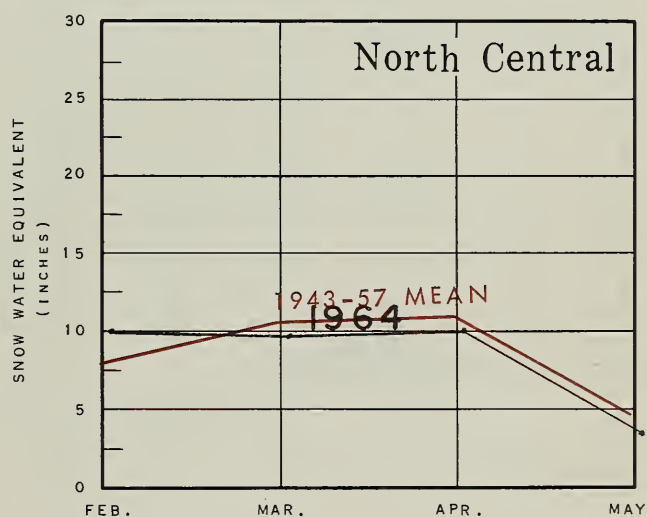
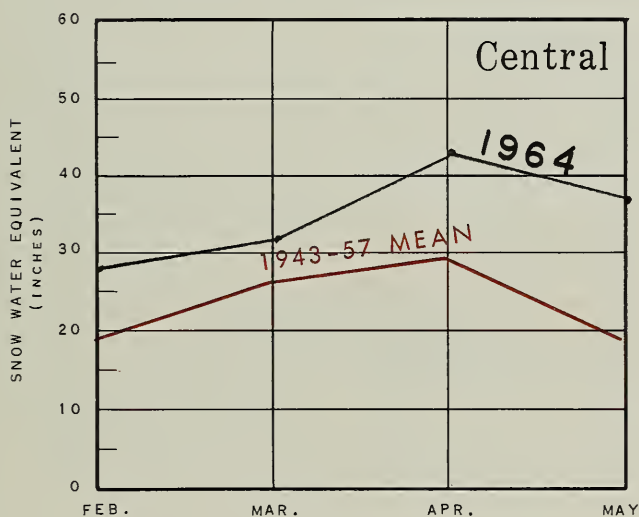
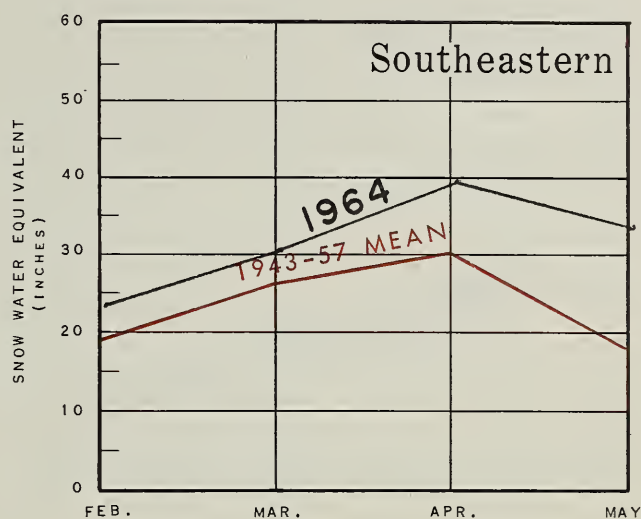
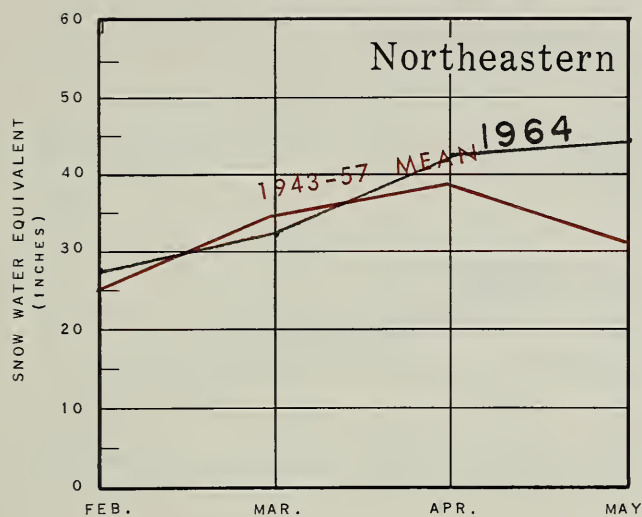
2/ - Departure from 15-year (1943-57) drainage division average.

Note - Precipitation shown in inches.

WASHINGTON SNOW COVER

1964

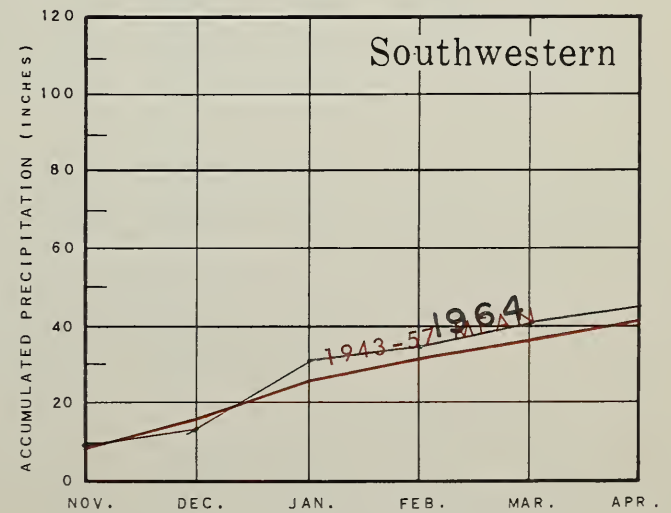
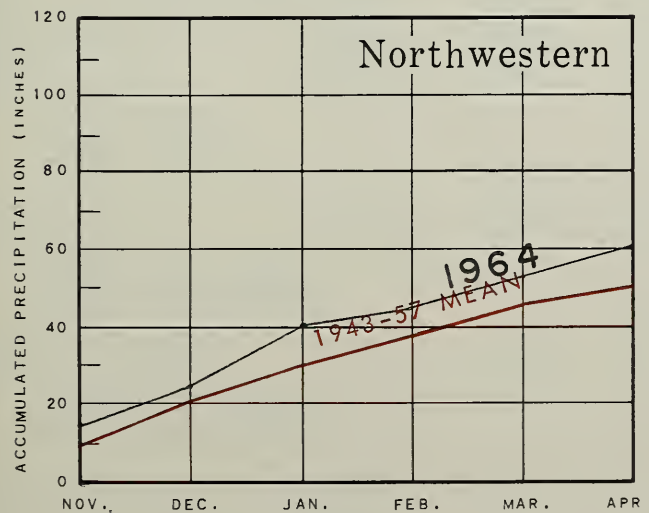
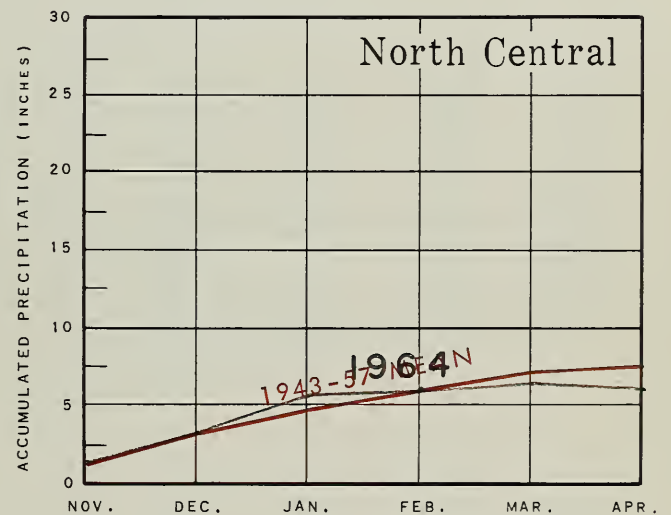
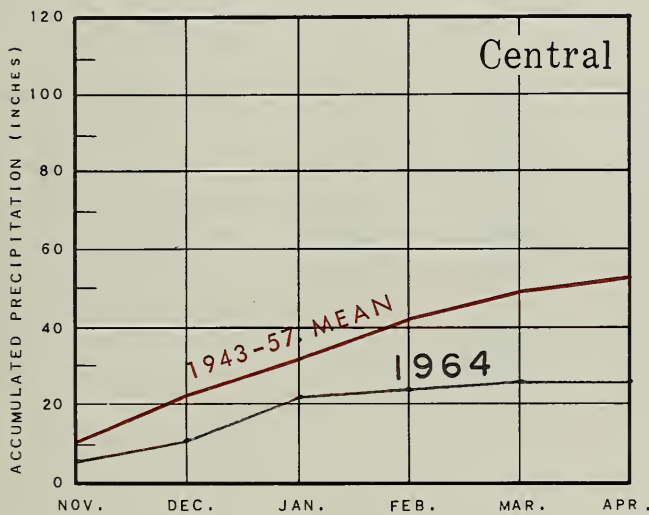
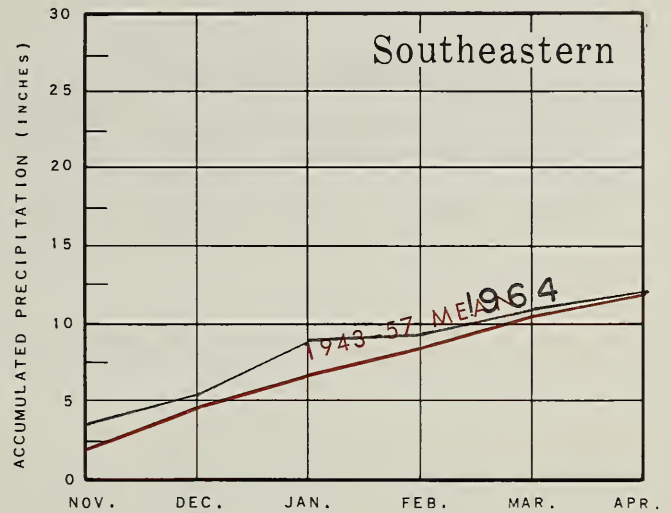
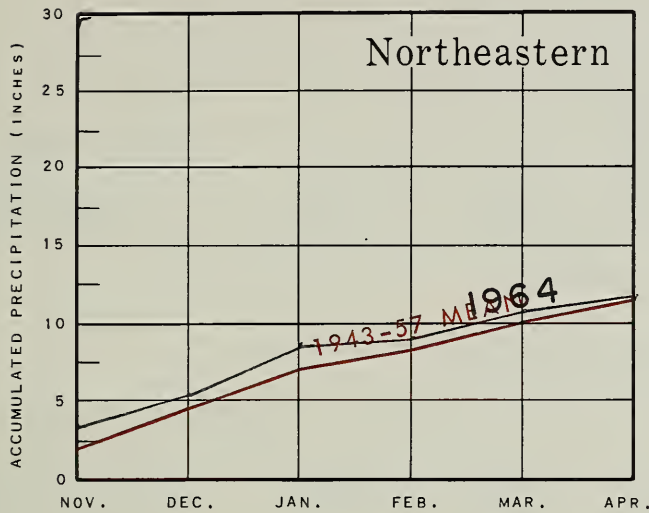
DRAINAGE AREAS



WASHINGTON VALLEY PRECIPITATION

1963 - 1964

DRAINAGE AREAS



APPENDIX 1

SNOW DATA MAY 1, 1964

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964	:P a s t R e c o r d				
			Date of Survey	Snow Depth (In.)	Water Content: (In.)	Water : Content (In.)	1943-57 Avg.	

MID-MONTH SURVEYS

Snow Surveys made on or about April 15, 1964

WENATCHEE RIVER

Blewett Pass #2	20B2	4270	4/14	36	15.0	0.0	8.8	14.7*
Stevens Pass	21B1	4070	4/15	180	57.9	30.9	45.5	57.0*

YAKIMA RIVER

#Blewett Pass #2	20B2	4270	4/14	36	15.0	0.0	8.8	14.7*
Bumping Lake	21C8	3450	4/14	39	16.1	4.0	9.0	13.8*
Lake Cle Elum	21B14M	2200	4/14	4	1.9	0.0	0.0	3.2*
#Olallie Meadows	21B2	3625	4/13	184	85.2	20.8	39.1	56.5*
#Stampede Pass	21B10	3000	4/14	189	62.2	23.7	39.1	53.6*
Tunnel Avenue	21B8	2450	4/14	77	40.4	2.6	14.4	25.5*
White Pass	21C9	4500	4/15	102	44.7	20.1	27.8	38.6*
White Pass(Ea. Side)	21C28	4500	4/14	78	31.1	13.6	21.4	36.6*
White Pass(Leech Lk.)	21C27	4500	4/15	94	42.2	12.5	23.2	--

COWLITZ RIVER

#White Pass	21C9	4500	4/15	102	44.7	20.1	27.8	38.6*
#White Pass(Ea.Side)	21C28	4500	4/14	78	31.1	13.6	21.4	36.6*
#White Pass(Leech Lk)	21C27	4500	4/15	94	42.2	12.5	23.2	--
Ohanapecosh	21C32	2200	4/15	41	17.5	--	--	--
Pigtail Peak	21C33	5900	4/15	206	96.5	40.4	--	--

GREEN RIVER

Stampede Pass	21B10	3000	4/14	189	62.2	23.7	39.1	53.6*
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SNOQUALMIE RIVER

Olallie Meadows	21B2	3625	4/13	184	85.2	20.8	39.1	56.5*
-----------------	------	------	------	-----	------	------	------	-------

SKYKOMISH RIVER

#Stevens Pass	21B1	4070	4/15	180	57.9	30.9	45.5	57.0*
---------------	------	------	------	-----	------	------	------	-------

*Adjusted 1943-57 average

#Not directly on this drainage

APPENDIX 2

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		: P a s t R e c o r d			
			Date	Snow of Depth	Water Content:	Water	Content (In.)	1943-57
			Survey	(In.)	(In.)	:1963	1962	Avg.

Snow Surveys made on or about April 15, 1964 (Cont'd)

BAKER RIVER

Dock Butte +	21A11A	3800	4/17	248	104.2	46.1	56.3	--
Easy Pass +	21A7A	5200	4/17	272	114.2	--	79.2	--
Jasper Pass +	21A6A	5400	4/17	242	101.6	72.9	56.3	--
Marten Lake +	21A9A	3600	4/17	250	105.0	51.1	55.9	--
Mount Blum +	21A18a	5800	4/17	232	97.4	New Course		
#Panorama	21A5	4300	4/15	241	88.9	63.6	65.5	--
Rocky Creek	21A12A	2100	4/17	105	44.1	0.0	10.6	--
Schreibers Meadow +	21A10A	3400	4/17	186	78.1	27.3	41.3	--
S.F. Thunder Creek +	21A14A	2200	4/17	6	2.5	0.0	0.0	--
Watson Lakes +	21A8A	4500	4/17	225	94.5	40.9	45.2	--

NOOKSACK RIVER

Panorama	21A5	4300	4/15	241	88.9	63.6	65.5	--
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* Adjusted 1943-57 average

Not directly on this drainage

+ Snow water equivalent estimated from aerial stadia observations

APPENDIX 3

SNOW DATA MAY 1, 1964

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		: P a s t		R e c o r d	
			Date of Survey	Snow Depth (In.)	Water Content: (In.)	Water Content: (In.)	Water Content (In.)	1943-57 Avg.

U P P E R C O L U M B I A D R A I N A G EP E N D O R E I L L E R I V E R

Baree Creek	15B11	5500	5/1	124	58.8	31.4	41.8	48.2
Benton Meadow	16A2	2344	4/29	0	0.0	0.0	0.0	0.0
Benton Spring	16A3	4900	4/28	48	21.6	7.8	12.0	17.8
Boyer Mountain	17A2	5250	4/27	60	27.9	17.4	23.6	21.3*
Brush Creek	14A4	5000	4/28	33	12.4	8.2	8.4	10.5*
Bunchgrass Meadow	17A1	5000	4/29	69	33.1	22.5	23.4	27.0
Hoodoo Creek	15C1	6200	4/30	126	55.2	35.5	44.5	46.9*
Lookout	15B2	5250	4/28	104	44.3	25.2	30.8	34.0*
Mosquito Ridge	16A4A	5100	Not Measured		--		31.6	33.5
Nelson	Canada	3050	4/30	32	13.4	0.0	6.2	--
Schweitzer Bowl	16A6	4500	4/29	64	30.6	New Course		
Schweitzer Ridge	16A5	6100	4/29	128	56.2	New Course		
Smith Creek	16A1	4800	4/30	115	56.4	30.7	39.0	46.3*
Winchester Creek	17A3	2970	4/26	0	0.0	0.0	1.5	--

K E T T L E R I V E R

Barnes Creek	Canada	5300	4/30	60	24.0	17.3	15.9	--
Boulder Road	18A2	1450	4/27	0	0.0	0.0	0.0	--
Butte Creek	18A3	4070	4/27	17	5.2	0.0	5.0	--
Cabin Creek	18A8	3170	4/27	0	0.0	0.0	0.0	--
Carmi	Canada	4100	5/1	0	0.0	0.0	--	--
Farron	Canada	4000	4/30	29	11.9	2.1	8.3	--
Goat Creek	18A4	3595	4/27	0	0.0	0.0	0.0	--
Monashee Pass	Canada	4500	4/30	40	16.3	11.2	11.6	12.4**
Snow Caps Creek	18A5	2150	4/27	0	0.0	0.0	0.0	--
Snow Caps Trail	18A6	2720	4/27	0	0.0	0.0	0.0	--
Summit G. S.	18A7	4600	4/27	22	6.4	2.9	5.8	--

S P O K A N E R I V E R

Copper Ridge	16B2	4800	4/28	91	44.0	9.0	23.5	27.8
Forty-nine Meadows	15B3	5000	4/28	81	40.0	17.0	24.4	34.2*
4th of July Summit	16B3	3100	4/28	8	3.2	0.0	0.0	--
Granite Peak	15B13A	6000	4/28	122	53.3	New Course		
Medicine Ridge	15B4A	6150	4/28	118	52.7	New Course		

* Adjusted 1943-57 average

** Average for years of record

APPENDIX 4

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		: P a s t R e c o r d			
			Date of Survey	Snow Depth (In.)	Water Content: (In.)	Water Content: (In.)	1943-57 Avg.	

SPOKANE RIVER (Cont'd)

#Lookout	15B2	5250	4/28	104	44.3	25.2	30.8	34.0*
Lower Sands Creek	16B1	3400	4/28	62	28.8	2.2	14.1	12.6*
#Mosquito Ridge	16A4A	5110	Not Measured		--		31.6	33.5*
Outlaw	15B12	3750	4/28	39	16.5	0.0	6.2	--

OKANOGAN RIVER

Aberdeen Lake	Canada	4300	4/30	15	3.3	0.0	0.0	1.4**
Blackwall Mountain	Canada	6250	4/30	105	48.4	35.3	27.7	--
Bouleau Creek	Canada	5000	5/2	31	10.5	4.0	7.4	--
Brookmere	Canada	3200	5/3	21	9.1	0.0	1.9	5.6**
Clark +	19A8a	7000	4/29	69	24.2	28.9	--	--
#Freezeout Meadows	20A2	5000	4/28	84	37.1	17.2	14.8	34.1*
Hamilton Hill	Canada	4900	4/30	42	18.0	8.6	5.6	--
#Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2
Lost Horse Mountain	Canada	6300	4/30	42	13.1	7.5	8.2	--
McCulloch	Canada	4200	4/30	14	4.9	0.8	2.8	2.7**
Missezula Mountain	Canada	5100	4/30	30	9.3	0.0	2.6	--
Mission Creek	Canada	6000	4/28	62	23.9	18.4	17.8	21.1**
Monashee Pass	Canada	4500	4/30	40	16.3	11.2	11.6	12.4**
Muckamuck +	19A9a	6390	4/29	48	16.8	22.5	--	--
Mutton Creek No. 1	19A1	5700	4/29	22	8.0	8.0	1.1	8.4*
Mutton Creek No. 2	19A4	6000	4/29	35	12.2	14.1	4.4	13.3*
Nickel Plate Mtn.	Canada	6200	5/1	38	12.1	5.1	7.9	--
Postill Lake	Canada	4500	4/29	21	7.8	3.4	4.4	6.6**
Rusty Creek	19A3	4000	4/29	0	0.0	0.0	0.5	1.2*
Salmon Meadows	19A2	4500	4/29	10	3.2	3.5	1.0	4.0*
Silver Star Mtn.	Canada	6050	4/30	80	32.4	20.0	15.8	22.3**
Starvation Mtn. +	19A10a	6750	4/29	63	22.0	30.4	--	--
Trout Creek	Canada	4700	4/30	20	6.8	2.1	1.8	4.8**

METHOW RIVER

Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2
#Mutton Creek No. 1	19A1	5700	4/29	22	8.0	8.0	1.1	8.4*
#Mutton Creek No. 2	19A4	6000	4/29	35	12.2	14.1	4.4	13.3*
#Rusty Creek	19A3	4000	4/29	0	0.0	0.0	0.5	1.2*
#Salmon Meadows	19A2	4500	4/29	10	3.2	3.5	1.0	4.0*

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

** Average for years of record

APPENDIX 5

			SNOW COVER MEASUREMENT					
			1964	: P a s t R e c o r d				
DRAINAGE BASIN and SNOW COURSE	No.	Elev.	Date of Survey	Snow Depth (In.)	Water Content: (In.)	Water Content: (In.)	Water Content: (In.)	1943-57 Avg.
<u>CHELAN LAKE BASIN</u>								
Rainy Pass	20A9	4780	4/30	112	51.1	33.2	31.0	44.3*
Safety Harbor	20A30	6300	Late Report					
<u>ENTIAT RIVER</u>								
Brief	20B19	1600	4/26	0	0.0	0.0	0.0	--
<u>WENATCHEE RIVER</u>								
Berne-Mill Creek	21B23	2925	4/29	70	33.7	0.0	6.5	--
Blewett Pass No. 2	20B2	4270	4/30	31	13.5	0.0	2.3	10.7*
Chiwaukum G. S.	20B16	1810	4/29	1	0.4	0.0	0.0	--
#Fish Lake	21B4	3371	4/29	82	37.4	8.4	19.0	27.0*
Lake Wenatchee	20B5	1970	4/29	0	0.0	0.0	0.0	--
Leavenworth R. S.	20B17	1127	4/27	0	0.0	0.0	0.0	--
Merritt	20B18	2140	4/29	10	4.6	0.0	0.0	--
Stevens Pass	21B1	4070	4/29	167	79.2	29.3	39.4	51.0*
<u>SQUILCHUCK CREEK</u>								
Beehive Springs	20B3	4400	4/29	0	0.0	0.0	0.0	1.4*
Scout-A-Vista	20B4	3400	4/29	0	0.0	0.0	0.0	0.0*
<u>STEMILT CREEK</u>								
Jump-Off	20B8	4450	4/30	0	0.0	0.0	0.0	--
Stemilt Slide	20B6	5000	4/30	0	0.0	4.8	0.0	--
Upper Wheeler	20B7	4400	4/30	0	0.0	0.0	0.0	--
<u>YAKIMA RIVER</u>								
Ahtanum R. S.	21C11	3100	4/30	0	0.0	0.0	0.0	0.0*
Big Boulder Creek	21B9	3200	4/29	37	15.9	0.0	0.0	6.8*
#Blewett Pass No. 2	20B2	4270	4/30	31	13.5	0.0	2.3	10.7*
Bumping Lake	21C8	3450	4/29	29	12.8	1.5	4.9	10.5*
Fish Lake	21B4	3371	4/29	82	37.4	8.4	19.0	27.0*
Lake Cle Elum	21B14M	2200	4/29	0	0.0	0.0	0.0	0.6*
Morse Lake	21C17	5400	4/28	143	66.7	43.7	63.0	68.0*
#Olallie Meadows	21B2	3625	4/28	183	87.2	17.3	33.1	51.5*
#Satus Pass	20D1	4030	4/28	10	4.7	0.0	0.0	--

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 6

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENT				
				1964	: P a s t R e c o r d			
				Snow Depth (In.)	Water Content: (In.)	Water Content: (In.)	Water Content (In.)	1943-57 Avg.

YAKIMA RIVER (Cont'd)

#Stampede Pass	21B10	3000	5/1	176	66.1	25.6	34.6	47.4*
Tunnel Avenue	21B8	2450	4/29	70	37.4	0.0	8.9	19.2*
White Pass	21C9	4500	4/28	97	45.2	20.2	24.4	36.9*
White Pass(Ea.Side)	21C28	4500	4/29	75	32.1	14.5	20.3	37.9*
White Pass(Leech Lk)	21C27	4500	4/28	92	42.6	14.1	19.0	--

AHTANUM CREEK

Ahtanum R. S.	21C11	3100	4/30	0	0.0	0.0	0.0	0.0*
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L O W E R C O L U M B I A D R A I N A G E

KLICKITAT RIVER

Satus Pass	20D1	4030	4/28	10	4.7	0.0	0.0	--
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WHITE SALMON RIVER

Cultus Creek	21C12	4000	4/30	120	55.4	23.0	43.6	52.1*
#Surprise Lakes	21C13A	4250	4/30	140	63.4	23.9	41.0	55.1*

WIND RIVER

Oldman Pass	21D19	3100	4/29	45	19.6	2.0	0.0	10.2*
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LEWIS RIVER

Blue Lake +	21C22a	4800	4/28	214	92.0	65.2	69.9	--
Bob's Trail	21C21	2200	4/30	29	11.5	0.0	0.0	--
Calamity Ridge +	22D1a	2500	4/28	5	2.2	0.0	0.0	--
Council Pass +	21C18a	4200	4/28	115	50.5	15.9	24.2	--
#Cultus Creek	21C12	4000	4/30	120	55.4	23.0	43.6	52.1*
Divide Meadow +	21C29a	5600	4/28	151	63.5	47.5	55.3	--
Grand Meadow	21C25	3500	4/30	61	25.4	9.5	15.2	--
Lone Pine Shelter	21C26	3800	4/28	115	53.2	23.1	31.4	--
Marble Mountain +	22C5a	3200	4/28	102	50.1	4.8	--	--
New Muddy River	22C6	2000	4/29	0	0.0	New Course		
Oldman Pass	21D19	3100	4/29	45	19.6	2.0	0.0	10.2*
Plains of Abraham +	22C1a	4400	4/28	164	75.4	43.6	61.1	81.6*
Smith Creek Road	22C4	2100	4/29	0	0.0	0.0	0.0	--

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 7

DRAINAGE BASIN and SNOW COURSE			SNOW COVER MEASUREMENT					
			1964		: P a s t R e c o r d			
			Date of Survey	Snow Depth (In.)	Water Content: (In.)	Water Content: (In.)	Water Content (In.)	1943-57 Avg.
No.	Elev.				:1963	1962		
<u>LEWIS RIVER (Cont'd)</u>								
Spencer Meadow +	21C20a	3400	4/28	58	27.3	0.0	2.0	--
Surprise Lakes	21C13A	4250	4/30	140	63.4	23.9	41.0	55.1*
Table Mountain +	21C24a	4200	4/28	118	51.9	27.0	39.2	--
Timbered Peak +	21D18a	3000	4/28	47	20.7	0.0	0.5	--
<u>COWLITZ RIVER</u>								
Ohanapecosh	21C32	2200	4/27	28	10.6	--	--	--
Pigtail Peak	21C33	5900	4/28	209	97.2	45.0	--	--
Plains of Abraham +	22C1a	4400	4/28	164	75.4	43.6	61.1	81.6*
#White Pass	21C9	4500	4/28	97	45.2	20.2	24.4	36.9*
#White Pass(Ea.Side)	21C28	4500	4/29	75	32.1	14.5	20.3	37.9*
#White Pass(Leech Lk)	21C27	4500	4/28	92	42.6	14.1	19.0	--
<u>P U G E T S O U N D D R A I N A G E</u>								
<u>WHITE RIVER</u>								
#Morse Lake	21C17	5400	4/28	143	66.7	43.7	63.0	68.0*
<u>GREEN RIVER</u>								
Stampede Pass	21B10	3000	5/1	176	66.1	25.6	34.6	47.4*
<u>SNOQUALMIE RIVER</u>								
Olallie Meadows	21B2	3625	4/28	183	87.2	17.3	33.1	51.5*
<u>SKYKOMISH RIVER</u>								
#Stevens Pass	21B1	4070	4/29	167	79.2	29.3	39.4	51.0*
<u>SKAGIT RIVER</u>								
Beaver Creek Trail	21A4	2200	4/28	18	8.4	0.0	0.0	8.1*
Beaver Pass	21A1	3680	4/28	94	41.9	13.7	18.7	37.1
Devils Park	20A4	5900	4/30	126	55.3	38.4	39.5	45.5*
Freezeout Cr. Tr.	20A1	3500	4/28	32	13.4	0.8	0.4	11.2*
Freezeout Meadows	20A2	5000	4/28	84	37.1	17.2	14.8	34.1*
#Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2
Lake Hozomeen	21A2	2600	4/28	28	10.4	0.0	0.0	9.2*

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 8

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			Date of Survey	1964 Snow Depth (In.)	Water Content: (In.)	: P a s t R e c o r d		
						Water Content (In.)		
						:1963	1962	1943-57 Avg.

SKAGIT RIVER (Cont'd)

Meadow Cabins	20A8	1900	4/30	12	5.1	0.0	0.0	2.4*
#Rainy Pass	20A9	4780	4/30	112	51.1	33.2	31.0	44.3*
Thunder Basin	20A7	4200	4/30	78	34.0	14.1	17.8	29.7*

BAKER RIVER

Dock Butte	21A11A	3800	5/1	228	110.1	46.1	62.1	--
Easy Pass	21A7A	5200	5/3	274	134.4	79.8	77.3	--
Jasper Pass	21A6A	5400	5/3	251	121.0	76.6	82.3	--
Koma Kulshan	21A17	800	5/1	0	0.0	0.0	0.0	--
Marten Lake	21A9A	3600	5/2	236	115.8	48.5	67.4	--
#Panorama	21A5	4300	4/29	236	99.8	62.0	76.8	--
Rocky Creek	21A12A	2100	5/2	80	35.7	0.0	0.0	--
Schreibers Meadow	21A10A	3400	5/2	187	92.3	36.6	52.6	--
S.F. Thunder Creek	21A14A	2200	5/1	11	4.8	0.0	0.0	--
Sulphur Creek	21A13	1600	5/2	33	14.1	0.0	0.0	--
Three Mile Creek	21A15	1600	5/1	0	0.0	0.0	0.0	--
Watson Lakes	21A8A	4500	5/3	206	98.9	44.5	59.8	--

NOOKSACK RIVER

Panorama	21A5	4300	4/29	236	99.8	62.0	76.8	--
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O L Y M P I C P E N I N S U L A

DUNGENESS RIVER

Deer Park	23B4	5200	4/27	63	26.9	--	--	--
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MORSE CREEK

14 Mile Post	23B11		4/27	0	0.0	New Course		
Morse Creek	23B12		4/28	132	59.5	New Course		

ELWHA RIVER

Hurricane	23B3	4500	4/28	84	35.7	--	--	--
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Not directly on this drainage

* Adjusted 1943-57 average

Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Conservation
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
Weather Bureau
U. S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District

MUNICIPALITIES

City of Walla Walla
City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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